

ABSTRACT

An interconnect structure of a semiconductor device includes a tungsten plug (14) deposited in a via or contact window (11). A barrier layer (15) separates the tungsten plug (14) from the surface of a dielectric material (16) within which the contact window or via (11) is formed. The barrier layer (15) is a composite of at least two films. The first film formed on the surface of the dielectric material (16) within the via (11) is a tungsten silicide film (12). The second film is a tungsten film (13) formed on the tungsten silicide film (12). A tungsten plug (14) is formed on the tungsten film (13) to complete interconnect structure. The barrier layer (15) is deposited using a sputtering technique performed in a deposition chamber. The chamber includes tungsten silicide target (19) from which the tungsten silicide film (12) is deposited, and a tungsten coil (20) from which the tungsten film (20) is deposited.